CHAPTER 10
MASONRY

SIFC-1001 GENERAL

SIFC-1001.1 Scope. The requirements of this chapter and IBC-1704.5 shall apply when construction includes masonry building elements as listed in SIFC-302.5. All masonry construction shall comply with IBC-2104 (see SIFC-1004 for construction in cold or hot weather).

SIFC-1001.2 Loads. No structural loads shall be imposed on any vertical load carrying member which is less than seven days old or less than 75% strength (masonry f'_m) unless the masonry strength criteria established by the **SER** for carrying such loads are satisfied.

SIFC-1001.3 Protection during construction. Masonry construction shall comply with applicable VOSHA regulations, including:

a. Bracing of walls. See SIFC-1002 for construction bracing design requirements. All masonry walls over 8'-0" (2438 mm) in height shall be laterally braced to prevent overturning and collapse unless the wall has adequate permanent lateral support. Construction bracing shall be erected as soon as masonry construction exceeds 8'-0" (2438 mm) in height. The bracing shall not be removed for any reason, and shall remain in place until permanent supporting elements of the structure are in place.

b. Limited access zone. A limited access zone shall be established whenever a masonry wall is being constructed. Entry to the zone shall be limited to employees actively engaged in constructing the wall. No other persons shall be permitted to enter the zone.

- **Zone location and extent.** The zone shall be established prior to the start of construction of the wall, on the side of the wall which will be unscaffolded. The zone minimum width shall be greater than or equal to the maximum height of the wall to be constructed plus 4'-0" (1219 mm) additional, and the zone minimum length shall be greater than or equal to the entire length of the wall to be constructed.
- **Zone duration.** The zone shall remain in place until the wall is laterally supported to prevent overturning and collapse, either by construction bracing or adequate permanent supporting elements of the structure.

SIFC-1002 FABRICATION AND ERECTION DOCUMENTS

The masonry fabrication and erection documents, including construction bracing designs and mortar and grout mix designs, shall be submitted for review and approval to the **AR**, **SER** and **FCCSS** prior to masonry construction. The **GC** shall submit two sets of **SER**-approved fabrication and erection documents to **FCCSS.** After County review and approval, **FCCSS** will return one set of County-approved fabrication and erection documents for use on the job site. County-approved documents shall be used by the **SIER** to conduct special inspections during construction.

- **Construction bracing.** Construction bracing designs shall comply with VOSHA

requirements and shall be submitted to **FCCSS** for review and approval. Construction bracing designs shall include consideration of wind forces, workmen and materials loadings, and anchorage. Construction bracing designs for walls greater than 12'-0" in height (3658 mm) shall be prepared, signed and sealed by **RDP**s.

SIFC-1003 SPECIAL INSPECTIONS

The **SIER** shall perform special inspections of masonry construction, including construction bracing, for conformance with County-approved documents and in accordance with IBC-1704.5, IBC-Table 1704.5.1, and IBC-Table 1704.5.3, depending upon the classification of the building or structure as an "essential" or "nonessential" facility and the type of masonry design as "empirical" or "engineered" masonry. (An "essential" facility usually means occupancy for disaster prevention or response, and "engineered" masonry usually means structural loadbearing masonry.)

IBC-1704.5 Masonry construction. Masonry construction shall be inspected and evaluated in accordance with the requirements of this section, depending on the classification of the building or structure or nature of occupancy, as defined by this code (see Tables 1604.5 and 1617.6).

Exception: Special inspections shall not be required for:
1. Empirically designed masonry, glass unit masonry, or masonry veneer designed by Section 2109, 2110, or ACI 530/ASCE 5/TMS 402 Chapters 5, 6 or 7 when they are part of nonessential buildings (see Tables 1604.5 and 1617.6).
2. Masonry foundation walls constructed in accordance with Table 1805.5(1), 1805.5(2), 1805.5(3) or 1805.5(4).

IBC-1704.5.1 Empirically designed masonry, glass unit masonry and masonry veneer in essential facilities. The minimum inspection program for masonry designed by Chapter 14, Section 2109 or 2110, or by Chapter 5, 6 or 7 of ACI 530/ASCE 5/TMS 402, in essential facilities (see Table 1604.5 and Section 1616.2) shall comply with Table 1704.5.1.

IBC-1704.5.2 Engineered masonry in nonessential facilities. The minimum special inspection program for masonry designed by Section 2106, 2107 or 2108, or by chapters other than Chapters 5, 6, or 7 of ACI 530/ASCE5/TMS 402, in nonessential facilities (see Table 1604.5 and Section 1616.2) shall comply with Table 1704.5.1.

IBC-1704.5.3 Engineered masonry in essential facilities. The minimum special inspection program for masonry designed by Section 2106, 2107 or 2108, or by chapters other than Chapters 5, 6 or 7 of ACI 530/ASCE5/TMS 402, in essential facilities (see Tables 1604.5 and 1617.6) shall comply with Table 1704.5.3.

IBC-TABLE 1704.5.1
LEVEL 1 SPECIAL INSPECTION

INSPECTION TASK	FREQUENCY OF INSPECTION		REFERENCE FOR CRITERIA		
	Continuous during task listed	Periodically during task listed	IBC section	ACI 530 / ASCE 5 / TMS 402[a]	ACI 530.1 / ASCE 6 / TMS 602[a]
1. As masonry construction begins, the following shall be verified to ensure compliance:					
a. Proportions of site prepared mortar.	—	X	—	—	Art. 2.6A
b. Construction of mortar joints.		X			Art. 3.3B
c. Location of reinforcement and connectors.		X			Art. 3.4
2. The inspection program shall verify:					
a. Size and location of structural elements.		X			3.3G
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.		X		Sec. 1.15.4, 2.1.2	
c. Specified size, grade and type of reinforcement.		X		Sec. 1.12	Art. 2.4, 3.4
d. Welding of reinforcing bars.	X		Sec. 2108.9.2.11 Item 2	Sec. 2.1.8.6, 2.1.8.6.2	
e. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F).		X	Sec. 2104.3, 2104.4		Art. 1.8
3. Prior to grouting, the following shall be verified to ensure compliance:					
a. Grout space is clean.		X			Art. 3.2D
b. Placement of reinforcement and connectors.	—	X	—	Sec. 1.12	Art. 3.4
c. Proportions of site-prepared grout.		X			Art. 2.6B
d. Construction of mortar joints.		X			Art. 3.3B
4. Grout placement shall be verified to ensure compliance with code and construction document provisions.	X	—	—	—	Art. 3.5
5. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X	—	Sec. 2105.3, 2105.4, 2105.5	—	Art. 1.4
6. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	—	X	—	—	Art. 1.5

For SI: °C = (°F - 32)/1.8.

a. The specific standards referenced are those listed in Chapter 35.

IBC-TABLE 1704.5.3
LEVEL 2 SPECIAL INSPECTION

INSPECTION TASK	FREQUENCY OF INSPECTION		REFERENCE FOR CRITERIA		
	Continuous during task listed	Periodically during task listed	IBC section	ACI 530/ ASCE 5/ TMS 402[a]	ACI 530.1/ ASCE 6/ TMS 602[a]
1. From the beginning of masonry construction, the following shall be verified to ensure compliance:					
a. Proportions of site-mixed mortar and grout.		X			Art. 2.6A
b. Placement of masonry units and construction of mortar joints.		X	—		Art. 3.3B
c. Placement of reinforcement and connectors.		X		Sec. 1.12.3	Art. 3.4
d. Grout space prior to grouting.	X				Art. 3.2D
e. Placement of grout.	X				Art. 3.5
2. The inspection program shall verify:					
a. Size and location of structural elements.		X			3.3G
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.	X			Sec. 1.15.4, 2.1.2	
c. Specified size, grade and type of reinforcement.		X		Sec. 1.12	Art. 2.4, 3.4
d. Welding of reinforcing bars.	X		Sec. 2108.9.2.11 Item 2	Sec. 2.1.8.6, 2.1.8.6.2	
e. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F).		X	Sec. 2104.3, 2104.4		Art. 1.8
3. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.	X	—	Sec. 2105.3, 2105.4, 2105.5	—	Art. 1.4
4. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.	—	X	—	—	Art. 1.5

For SI: °C = (°F - 32)/1.8.

a. The specific standards referenced are those listed in Chapter 35.

SIFC-1004 COLD-WEATHER AND HOT-WEATHER CONSTRUCTION

SIFC-1004.1 Cold weather. When either the ambient temperature falls below 40°F (4°C), or the temperature of masonry units is below 40°F (4°C), cold weather construction requirements as specified in IBC-Table 1704.5.1 or IBC-Table 1704.5.3 and IBC-2104.3 shall be implemented.

IBC-2104.3 Cold-weather construction. The following cold-weather procedures shall be implemented when either the ambient temperature falls below 40°F (4°C) or the temperature of masonry units is below 40°F (4°C):

1. Temperatures of masonry units shall not be less than 20°F (-7°C) when laid in the masonry. Visible ice on masonry units shall be removed before the unit is laid in the masonry.
2. Mortar sand or mixing water shall be heated to produce mortar temperatures between 40°F (4°C) and 120°F (49°C) at the time of mixing. Mortar shall be maintained above freezing until used in masonry.
3. Heat sources shall be used where ambient temperatures are between 20°F (-7°C) and 25°F (-4°C) on both sides of the masonry under construction and wind breaks shall be installed when wind velocity is in excess of 15 mph (24 km/hr).
4. Where ambient temperatures are below 20°F (-7°C), an enclosure for the masonry under construction shall be provided and heat sources shall be used to maintain temperatures above 32°F (0°C) within the enclosure.
5. Where mean daily temperatures are between 32°F (0°C) and 40°F (4°C), completed masonry shall be protected from rain or snow by covering with a weather-resistant membrane for 24 hours after construction.
6. Where mean daily temperatures are between 25°F (-4°C) and 32°F (0°C), completed masonry shall be completely covered with a weather-resistant membrane for 24 hours after construction.
7. Where mean daily temperatures are between 20°F (-7°C) and 25°F (-4°C), completed masonry shall be completely covered with insulating blankets or equal protection for 24 hours after construction.
8. Where mean daily temperatures are below 20°F (-7°C), masonry temperature shall be maintained above 32°F (0°C) for 24 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps or by other approved methods.
9. Glass unit masonry shall not be laid during cold periods as defined in this section. The temperature of glass unit masonry shall be maintained above 40°F (4°C) for the first 48 hours after construction.

SIFC-1004.2 Hot weather. When either the ambient temperature equals or exceeds 100°F (38°C), or the ambient temperature equals or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (13 km/h), hot weather construction requirements as specified in IBC-Table 1704.5.1 or IBC-Table 1704.5.3 and IBC-2104.4 shall be implemented.

IBC-2104.4 Hot weather construction. The following hot-weather procedures shall be implemented when the temperature or the temperature and wind-velocity limits of this section are exceeded.

IBC-2104.4.1 Preparation. The following requirements shall be met prior to conducting masonry work.

IBC-2104.4.1.1. Temperature. When the ambient temperature exceeds 100°F (38°C), or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (13 km/h):

1. Necessary conditions and equipment shall be provided to produce mortar having a temperature below 120°F (49°C).
2. Sand piles shall be maintained in a damp, loose condition.

IBC-2104.4.1.2. Special conditions. When the ambient temperature exceeds 115°F (46°C), or 105°F (40°C) with a wind velocity greater than 8 mph (13 km/h), the requirements of Section 2104.4.1.1 shall be implemented, and materials and mixing

equipment shall be shaded from direct sunlight.

IBC-2104.4.2 Construction. The following requirements shall be met while masonry work is in progress.

IBC-2104.4.2.1. Temperature. When the ambient temperature exceeds 100°F (38°C), or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (13 km/h):
1. The temperature of mortar and grout shall be maintained below 120°F (49°C).
2. Mixers, mortar transport containers and mortar boards shall be flushed with cool water before they come into contact with mortar ingredients or mortar.
3. Mortar consistency shall be maintained by retempering with cool water.
4. Mortar shall be used within 2 hours of initial mixing.

IBC-2104.4.2.2. Special conditions. When the ambient temperature exceeds 115°F (46°C), or exceeds 105°F (40°C) with a wind velocity greater than 8 mph (13 km/h), the requirements of Section 2104.4.2.1 shall be implemented and cool mixing water shall be used for mortar and grout. The use of ice shall be permitted in the mixing water prior to use. Ice shall not be permitted in the mixing water when added to the other mortar or grout materials.

IBC-2104.4.3 Protection. When the mean daily temperature exceeds 100°F (38°C), or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (13 km/h), newly constructed masonry shall be fog sprayed until damp at least three times a day until the masonry is three days old.

SIFC-1004.3 Temperature records. The **SIER** shall maintain and submit temperature records with daily inspection reports.

SIFC-1005 COMPLETION OF MASONRY CONSTRUCTION

Upon completion of masonry special inspections, the **SIER** shall, after review and approval by the **SER,** submit a completion letter to **FCCSS** and shall indicate the date of completion on the final report of special inspections.